

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Previously Presented) A method of depositing a silica glass insulating film over a substrate, the method comprising:

exposing the substrate to a silicon-containing reactant introduced into a chamber in which the substrate is disposed such that one or more layers of the silicon-containing reactant are adsorbed onto the substrate;

purging or evacuating the chamber of the silicon-containing reactant;

converting the silicon-containing reactant into a silica glass insulating compound using primarily thermal energy to provide activation energy to drive the deposition reaction by exposing the substrate to oxygen radicals formed from a second reactant while biasing the substrate to promote a sputtering effect; and

repeating the exposing, purging/evacuating and exposing sequence a plurality of times.

2. (Previously Presented) A method of depositing a silica glass insulating film over a substrate, the method comprising:

exposing the substrate to a silicon-containing reactant introduced into a chamber in which the substrate is disposed such that one or more layers of the silicon-containing reactant are adsorbed onto the substrate;

purging or evacuating the chamber of the silicon-containing reactant;

converting the silicon-containing reactant into a silica glass insulating compound by exposing the substrate to oxygen radicals formed from a second reactant while introducing a fluent gas into the chamber and biasing the substrate to promote a sputtering effect, wherein an average atomic mass of all atomic constituents introduced into the chamber during the converting step is less than or equal to an average atomic mass of oxygen; and

repeating the exposing, purging/evacuating and exposing sequence a plurality of times.

3. (Original) The method of claim 1 wherein the silicon-containing reactant is a silane family member having a formula of Si_nH_{2n+2}.

4. (Original) The method of claim 3 wherein the second reactant consists of molecular oxygen (O_2).

5. (Previously Presented) The method of claim 1 wherein the second reactant consists of molecular oxygen (O_2) and a sputtering agent is introduced into the chamber along with the second reactant.

6. (Original) The method of claim 5 wherein the sputtering agent consists of molecular hydrogen (H_2).

7. (Previously Presented) The method of claim 5 wherein the sputtering agent comprises molecular hydrogen (H_2) and/or helium.

8. (Original) The method of claim 1 wherein the oxygen radicals are generated by forming a plasma within the chamber.

9. (Original) The method of claim 1 wherein the oxygen radicals are generated by forming a plasma in a remote plasma chamber.

10. (Original) The method of claim 1 wherein the chamber is evacuated of the silicon-containing reactant prior to exposing the substrate to oxygen radicals.

11. (Original) The method of claim 1 wherein the chamber is purged of the silicon-containing reactant by flowing a gas that is chemically inert to silica glass into the chamber.

12. (Original) The method of claim 1 wherein the chamber is purged of the silicon-containing reactant by flowing an oxygen source into the chamber.

13. (Original) The method of claim 8 wherein energy is applied to the chamber to form a plasma from the second reactant while biasing the substrate and wherein no plasma is formed while the substrate is exposed to the silicon-containing reactant.

14. (Original) The method of claim 1 further comprising doping the silica glass film with a dopant.

15. (Previously Presented) A method of depositing a silica glass insulating film over a substrate having a gap formed between two adjacent raised features, the gap having a bottom surface and a sidewall surface, the method comprising:

exposing the substrate to a silicon-containing reactant introduced into a chamber in which the substrate is disposed such that one or more layers of the silicon containing reactant are adsorbed onto the substrate;

purging or evacuating the chamber of the silicon-containing reactant;

converting the silicon-containing reactant into a silica glass insulating compound by exposing the substrate to a plasma formed from a second reactant comprising oxygen atoms while biasing the substrate to promote a sputtering effect, wherein an average atomic mass of all atomic constituents introduced into the chamber during the converting step is less than or equal to an average atomic mass of oxygen; and

repeating the exposing, purging/evacuating and exposing sequence a plurality of times;

wherein the substrate is maintained at a temperature between 300-800°C during growth of the silica glass film and wherein the silica glass film grows up from the bottom surface of the gap at a rate greater than it grows inward on the sidewall surface of the gap.

16. (Previously Presented) The method of claim 1 further comprising monitoring an amount of oxidation that occurs during the converting step and stopping the converting step when a determination has been made that full oxidation has occurred.

17. (Previously Presented) The method of claim 16 wherein the monitoring step comprises detecting radiation reflected from the surface of the substrate, comparing interference patterns to previous patterns that represent a fully oxidized film and generating a signal that can be used to endpoint the converting step.

18. (Previously Presented) The method of claim 1 wherein multiple layers of the silicon-containing reactant are adsorbed onto the substrate surface during the step of exposing the substrate to the silicon-containing reactant.

19. (Previously Presented) The method of claim 2 further comprising monitoring an amount of oxidation that occurs during the converting step and stopping the converting step when a determination has been made that full oxidation has occurred.

20. (Previously Presented) The method of claim 19 wherein the monitoring step comprises detecting radiation reflected from the surface of the substrate, comparing interference patterns to previous patterns that represent a fully oxidized film and generating a signal that can be used to endpoint the converting step.

21. (Previously Presented) The method of claim 2 wherein the second reactant comprises molecular oxygen and the fluent gas is selected from the group consisting of helium, hydrogen and a combination thereof.

22. (Previously Presented) The method of claim 2 wherein multiple layers of the silicon-containing reactant are adsorbed onto the substrate surface during the step of exposing the substrate to the silicon-containing reactant.

23. (Previously Presented) The method of claim 15 further comprising monitoring an amount of oxidation that occurs during the converting step and stopping the converting step when a determination has been made that full oxidation has occurred.

24. (Previously Presented) The method of claim 23 wherein the monitoring step comprises detecting radiation reflected from the surface of the substrate, comparing interference patterns to previous patterns that represent a fully oxidized film and generating a signal that can be used to endpoint the converting step.

25. (Previously Presented) The method of claim 23 wherein multiple layers of the silicon-containing reactant are adsorbed onto the substrate surface during the step of exposing the substrate to the silicon-containing reactant.

26. (Previously Presented) The method of claim 15 wherein the second reactant comprises molecular oxygen and wherein a fluent gas selected from the group consisting of helium, hydrogen and a combination thereof is introduced into the chamber along with the second reactant.

27. (Previously Presented) The method of claim 1 wherein the substrate is maintained at a temperature of at least 300°C during the growth of the silica glass film.

28. (Previously Presented) The method of claim 2 wherein the substrate is maintained at a temperature of at least 300°C during the growth of the silica glass film.

29. (Canceled).